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Effect of irrigation with magnetized water and spraying with humic acid on the vegetative and flowering growth characteristics of the rose plants *(Elida)*.

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• The research is extracted from a master's thesis of the first researcher

Abstract: This experiment was carried out in the wooden canopy of the Department of Agriculture, with a percentage of 50% shading, located at latitude (35.456) and longitude (44.388), Kirkuk during the period from 1/6/2020 to 1/6/2021 in order to monitor the growth of the hybrid rose plant during a whole year. In the city of Kirkuk observing the effect of the study of magnetized water and spraying with humic acid on the vegetative and flowering growth characteristics of the Elida rose plant. Humic concentration (0, 2.5, 5) g. Liter^{-1} and by four sprays, the experiment was implemented using the RCBD randomized complete block design with three replications, and one experimental unit contained four plants. The results showed that both intensities of magnetized water 900 and 1800 gauss were significantly superior to the comparison treatment in terms of plant height, and the fresh weight of the root system, which amounted to (75.55 cm and 75.33 cm). And 42.33 g and 45.10 g), respectively. The highly treated plants exceeded 1800 gauss in anumber of leaves, fresh weight of shoots, flower diameter, which amounted to (48.22 leaves. Plant-1, 89.99g, 7.76 cm), respectively, The two concentrations of humic acid (2.5 and 5 g.l^{-1}) were superior in plant height, flower diameter and reached (71.77 cm, 79.77 cm, 7.14 cm, 7.5 cm), respectively, when using a concentration of 5 g. L^{-1} significantly increased the number of leaves, the fresh weight of the vegetative group, and the fresh weight of the root system of plants, reaching (45.11 leaves. Plant-1, 83.11 g, 47.99 g),respectively.

Keywords: rose plant, magnetized water, humic acid.

Introduction

Rose hybrid plants are considered one of the first flowers that man was interested in planting, as rose bush was found growing in central Asia from 4000 BC, Abu Al-Dhahab and others (1992) and rose bush is a perennial or climbing plant that follows the rose family. Rosa cease It follows the genus Rosa and is characterized by flowering throughout the year and its flowers live for a long period after picking. (Sultan et al., 1992). The importance of the rose lies not in considering it as one of the main cut flowers and in its use as an ornamental plant, but in the fact that it contains many effective ingredients. Its flowers contain an essential oil known as Rosa oil, in addition to the oil-containing vitamin C, which reaches 0.1_1% (Al-Samarrai, 2000). And Rao 2002) showed that magnetically treating the water leads to an increase in the fluidity of the water as a result of reducing the surface tension and the surface area of the water. . Al-Fatlawi (2007) added that magnetically treated water increases plant growth as a result of increasing root growth and improving its ability to absorb nutrients. The magnetized water technology increases the availability and readiness of nutrients, which increases the speed of their absorption because these elements in aqueous solutions will change their arrangement and organization when exposed to a magnetic field, and thus they pass quickly andready to the cell membranes, which positively affects the growth and outcome. Adachi (2007) mentioned thatmagnetically treated water increases root growth as a result of increasing the absorption of nutrients, which inturn leads to an increase in yield. He added that the use of treated water in irrigation increases the ability of the soil to retain water for a longer period, which reduces the amount of irrigation water and treated water It increases the efficiency of the added fertilizers due to the increase in the availability of nutrients and the speedof their absorption by the plant, which reduces the amount of added fertilizer. Currently, there is a global trendto use organic fertilizers of all kinds and sources to mitigate as much as possible the negative effects of chemical fertilizers. Humic acid is one of among the organic fertilizers that are widely used due to its many

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benefits in improving soil properties and its effect on plant growth and production. The readiness of these plants is of great importance (Kirkby and Mengel, 1982.) Humic acid is one of the most common commercial products. Anonymous, which is widely used nowadays, is fast effective, and harmless to humans and plants (Anonymous, 2005). Muhammad Amin et al. (2010) found that irrigation of Rosa damascene plants with magnetically treated water at both flux intensities (500 and 1500) Gauss led to a significant increase in plant height, branch diameter, number of leaves, leaf area, and dry weight of vegetative growth. Decreased number of branches. The effect of irrigating plants with water treated with 500 gausses exceeded that of water treated with 1500 gauss in most traits, as the plant height was 69.65 cm, branch diameter was 3.86 cm, a number of leaves were 100.25 leaves/plant, and leaf area was 89.38 cm2, and it was found that spraying rose seedlings with humic acid in two concentrations. (4-5 ml. L-1) concentration (4 ml. L-1) gave a significant increase in plant height, number of branches, leaf area, number of flowers, chlorophyll content of leaves, and leaf content of nitrogen, phosphorous, and potassium (Hadi et al. 2019). Spraying dwarf rose plants, Rose pygmaea, at a concentration of 4 g. 1 liter of humic acid had a significant effect on plant height, number of leaves, number of flowers, and holder diameter compared to untreated plants (Al-Bayati, 2018).

Materials and methods:

The experiment was carried out in greenhouses (shade ratio 50%) of the Kirkuk Agriculture Department for a period from (06-01-2020) to (06-01-2021) in order to know the effect of the power of magnetized water and spraying with humic acid on the vegetative and flowering growth of the hybrid rose plant variety) Elida). One-year-old rose plants (Elida) were transferred to plastic anvils with a diameter of 10 cm and then transformed into anvils with a diameter of 40 cm, the capacity of 26 liters, on 1/6/2020.

The first factor: - humic acid (acro humic acid). The granular type acro humic acid produced by (Acronic) was designed to be mixed with water with a solubility of 100%. The humic acid granules were dissolved in distilled water and the plants were sprayed in the early morning (the beginning of Sunrise) at a rate of four sprays for four months (according to the company's recommendation). The spraying dates were as follows: - June 1, July 2, August 1, and September 3.

1- The comparison treatment is spraying with distilled water only.
2- Treatment of spraying with humic acid at a concentration of (2.5 g. L^{-1}).
3- Treatment of spraying with humic acid at a concentration of (5 g. L^{-1}).

The second factor is magnetized water with three forces

1- The comparison treatment (0 causses).
2- Treatment of irrigation with magnetized water with a strength of (900 gausses).
3- Treatment of irrigation with magnetized water with a strength of (1800 gauss).

SAS (1996) program was used to analyze the data and the rates were tested according to Duncan's Multiple Range Test at a probability level of 5% (Mead and Hasted 2003,).

Results and discussion:

1- Plant height (cm):

It is noticed from Table (1) that there are significant differences when irrigating Eilda rose plants with different levels of magnetized water. The height of the plant is 69.44 cm. These results agree with Muhammad Amin et al. (2011) in his study of the effect of watering with magnetically treated water, whereby irrigation with magnetized water led to a significant increase in most of the vegetative growth characteristics of rose plants and the superiority of the treated water with a strong overflow of 500 gausses compared to the control treatment.

It is also noted from Table No. (1) That there is a significant increase in plant height when spraying the hybrid rose variety with average humic acid at a concentration of (2.5-5) g. L^{-1} (71.77 and 79.77), respectively, compared to the control treatment, which was the average plant height (66.77) cm. The average humic acid was also superior at a concentration of 5 g. L^{-1} at a concentration of 2.5 g. L^{-1} and this is consistent with Al-Bayati (2018) in his study on rose plants, where he showed a significant increase in plant height when plants were sprayed with humic acid at a level of 4 g. L^{-1} compared with the comparison treatment.

All the interactions between magnetized water (900-1800) gauss and humic acid (2.5-5) g L^{-1} were significantly superior to the comparison treatment (0 gausses of magnetized water and 0 g L^{-1} humic acid).

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The highest height of the plant reached 83 cm at the overlap between 1800 gauss of magnetized water and 5 gm L^{-1} humic acid.

Table No. (1) The effect of magnetic field strength and humic acid concentrations and the interactionbetween them on the average plant height of the hybrid rose cultivar Elida.

Effect of the magnetic field gauss	effect of humic acid g.L^{-1}			Average strength of the magnetic field
	0	2.5	5	
0	59.66 c	71 b	77.66 ab	69.44 b
900	71 b	77 ab	78.66 ab	75.55 a
1800	69.66 b	73.33 ab	83 a	75.33 a
Humic acid Average	66.77 c	71.77 b	79.77 a	

2- The number of leaves, a leaf. Plant^{-1}

The number of leaves increased significantly with the increase of the average level of magnetic water used in the experiment, where the highest value of the number of leaves reached 48.22 papers at the level of 1800 gauss with a significant difference with the comparison treatment and 900 gausses, which amounted to (35.44 and 38.33) sheets, respectively. This agrees with Amin et al. 2010) where it was shown that irrigation of plants with magnetically treated water of both flux intensities (500 and 1500) Gauss led to a significant increase in the number of leaves. And between Al-Maadidi et al. (2006) that irrigation of plants with magnetic water had a significant effect on the number of leaves, and it may be due to the fact that water treatment Magnetization led to an increase in the availability of nutrients as a result of the effect of the magnetic field on the hydrogen bonds in the soil water, which causes its easy entry into the roots, as well as the small size of the water aggregates, which speeds up the entry of water into the root hairs, carrying nutrients with it (Al-Gawthry, 2006).

It appears from the table that there were significant differences in the number of leaves of plants when spraying rose plants of Elida cultivar with humic acid at a concentration (5 g. L-1) compared with the spray treatment at a concentration (0 g. L-1) where the number of leaves increased from (36.66 to 45.22) leaf. L-1 humic acid has outperformed in the number of leaves compared to the comparison plants. The reason is that humic is one of the necessary elements for plant growth and development, although it does not enter into any of the cellular components and plays the role of a catalyst in many vital processes, including the formation of Proteins, nucleic acids, and photosynthesis, in addition to the importance of humic in cell division as a result of activating special enzymatic activities (Bidwell, 1979).

The number of leaves increased by the treatment of the interaction with 1800 gauss of magnetized water with (5 g. L-1) humic acid, where the number of leaves was 56 leaves. Plant -1 with a significant increase over the rest of the interactions, and the lowest value was the interaction of 0 gausses of magnetized water and 0 g. L-1 humic acid (31.33 leaves).

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Table No. (2) The effect of magnetic field strength and humic acid concentrations and the interactionbetween them on the average number of leaves of the Elida hybrid rose plant.

Effect of the magnetic field gauss	effect of humic acid g.L^{-1}			Average strength of the magnetic field
	0	2.5	5	
0	31.33 e	39.66 bcd	35.33 de	35.44 c
900	34.66 de	36.33 cd	44.00 b	38.33 b
1800	44.00 b	44.66 bc	56.00 a	48.22 a
Humic acid Average	36.66 b	40.21 b	45.11 a	

3- Fresh weight of the vegetative system:

We notice from Table (3) that there are significant differences, where there was a significant increase in the fresh weight of the shoot when the hybrid rose plant was treated with magnetized water (1800 gauss) and it amounted to 89.9 g compared with the treatment of irrigation with 0 and 900 gauss, which was in the amount of (63.33 - 73.3) g respectively

This is due to the fact that the magnetic field increases the suspended particles in the water through ionization processes, the formation of electrically charged particles, and the redistribution of mineral elements, which increases the efficiency of the polarity of its particles, and then increases the strength of cracking the surfaces of salt crystals, dismantling and dissolving them, and benefiting the plant from them (Hatium and Alatei 2004). We note from the table an increase in the fresh weight of plants at an average of (2.5 and 5 g.l-1) of humic acid, where the fresh weight of the shoot reached (74.44 and 83.11 g, respectively, compared with the treatment (0 g.l-1) where The fresh weight of the shoot reached (69.11) g. The method of spray fertilization is effective in increasing the quantity of yield and improving the quality in addition to the abundance of vegetative growth (Kuepper, 2003). The reason for this is due to the positive role of the element through its direct intervention in the metabolic and functional processes, which leads to an increase in cell division and elongation of cells Nardi, (2002).) It is also attributed to the provision of nutrients and what the plant needs, which is included in the construction of chlorophyll, protein, and nucleic acids, and then increasing the ability of the plant to carry out the process of photosynthesis and the manufacture of nutrients that play a role in cell division and elongation (Abdul, 1978), and this is consistent with what was reached (Gomaa). And others, 1986).

Also, significant differences were observed in the interaction of the effect of magnetized water with spraying humic acid, which increased to (101.33 g) at 1800 magnetized water and 5 humic acids compared with the control treatment 0 gausses with 0 g.L-1 humic acid, where the fresh weight of the vegetative total reached (54.33).) cloud.

Table No. (3) The effect of magnetic field strength and humic acid concentrations and the interactionbetween them on the average fresh weight of the vegetative mass (gm) of the Elida rose plant.

Effect of the magnetic field gauss	effect of humic acid g.L^{-1}			Average strength of the magnetic field
	0	2.5	5	
0	54.33 c	64.66 bc	71.00 bc	63.33 b
900	73.00 bc	70.00 bc	77.00 bc	73.33 b
1800	80.00 ab	88.66 ab	101.33 a	89.99 a
Humic acid Average	69.11 b	74.44 ab	83.11 a	

4-Root fresh weight:

The results of Table (4) indicate that there are differences in the average fresh weight of the soft root aggregate when the averages were treated with magnetized water of two intensities (900 and 1800), which were superior to the comparison treatment, and the wet weight of the root group was (42.33 - 45.10) g, respectively, compared with the control treatment (38.77) g This is in agreement with Al-Najm et al. (2015) using

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magnetized water to grow potatoes.It may be due to the fact that magnetization has a significant effect on the values of root length average if the values of root length increase when magnetizing river water compared to non-magnetized water. Plant activity and improvement of the root group (Al-Maarouf, 2007).

It is also noted from the table that there are significant differences in the root and soft weight when plants were treated with humic acid, where the spraying level exceeded 5 g. L-1 over the rest of the treatments, and the average root weight was (47.99), and for the interactions between treatments, significant differences were noted, as the interference of irrigation with magnetized water outweighed 900 gausses and 0 g. L-1 humic acid and 51 kg were recorded. Liter-1 compared to a significant difference with the comparison treatment.

Table No. (4) The effect of magnetic field strength and humic acid concentrations and the interactionbetween them on the average fresh root weight (gm) of Elida rose plant.

Effect of the magnetic field gauss	effect of humic acid g.L^{-1}			Average strength of the magnetic field
	0	2.5	5	
0	27.33 d	40.00 bc	49.00 a	38.77 b
900	51.00 a	35.33 c	40.66 bc	42.33 a
1800	38.66 bc	42.33 b	54.33 a	45.10 a
Humic acid Average	38.99 b	39.22 b	47.99 a	

5-Average flower diameter:

The table shows that there are significant differences when irrigating the Eldia rose plant with magnetized water, which gave the largest diameter of the flower at an average of 1800 gauss, and it was 7.76 cm with a significant difference compared to the rest of the averages. Rosa damascene increased significantly when plants were irrigated with magnetically treated water of 500 gausses, as it reached 12.98 cm, while the flower diameter in plants irrigated with normal water was 8.91 cm.

The flower diameter increased when spraying rose plants with humic acid, where the spray treatment (5 g.l- 1) was superior, and the flower diameter was recorded (7.50 cm) with a significant difference over the rest of the averages. This does not agree with Al-Bayati (2018), where it was found that there were no clear significant differences in the characteristic of flower diameter when spraying the dwarf rose plant with different levels of humic acid.

And from the interaction of the treatments, it is noted that the treatment of magnetized water at the irrigation level (1800 gauss with 0 g. L-1 of humic acid) and the largest diameter of the flower was recorded at 8.20 cm. And also the superiority of the two levels (900 gausses of magnetized water with 5 g. L-1 of humic acid). And (1800 gauss with 5 and 2.5 g.l-1) and recorded (8.00, 7.50 and 7.50) cm respectively, and the lowest value of the comparison treatment was (0 gauss of magnetized water and 0 g.l-1 humic acids), where the average weight of the flower is 6.16 cm.

Table No. (5) Effect of magnetic field strength, humic concentrations, and interference on the average flower diameter (cm) of the hybrid rose plant variety Elida.

Effect of the magnetic field gauss	effect of humic acid g.L^{-1}			Average strength of the magnetic field
	0	2.5	5	
0	6.16 d	6.60 bc	7.00 c	6.58 b
900	7.16 d	7.33 bc	8.00 b	7.49 b
1800	8.20 a	7.50 b	7.50 b	7.76 a
Humic acid Average	7.17 b	7.14 a	7.50 a	

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